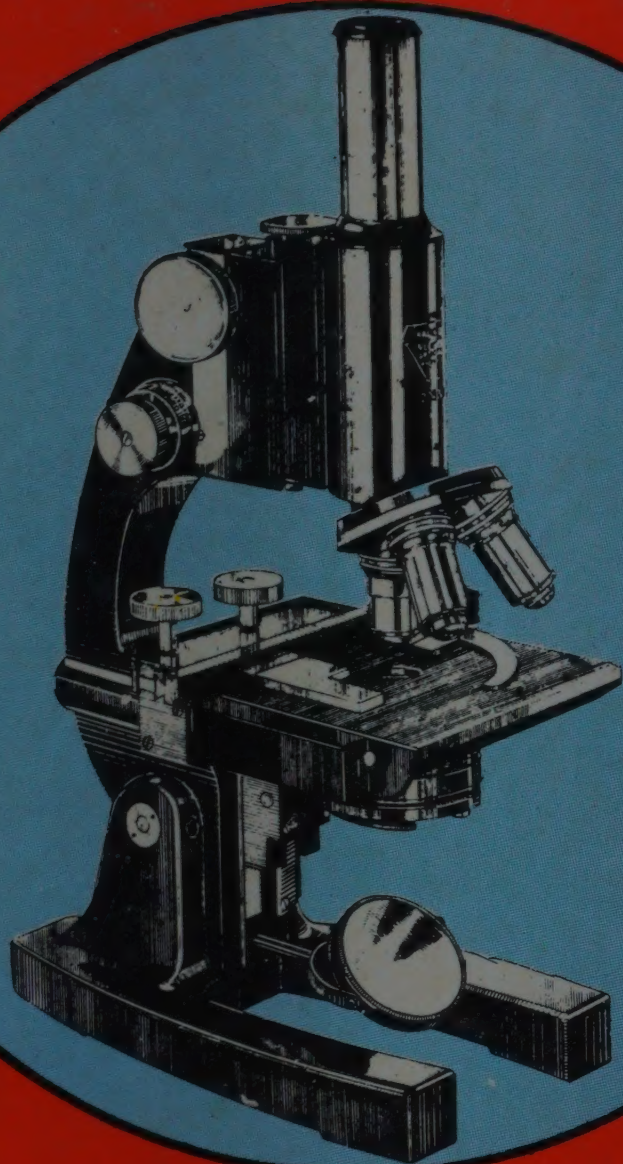


# DEFEAT TB

COMMUNITY  
STRENGTH  
COURAGE

## NOW AND FOR EVER



## STRENGTHEN NATIONAL TUBERCULOSIS PROGRAMME

NATIONAL TUBERCULOSIS INSTITUTE  
BANGALORE

1985  
SILVER JUBILEE

Issued by  
Directorate General of Health Services, New Delhi.



### NATIONAL T

The National Tuberculosis Institute started in 1960 by the Government support of the World Health Organization Experts headed by Dr. H. Mahle with national counterparts to evolve was formally introduced in the country the basic functioning unit of National the programme was to establish District and supervise the programme in all

The main purpose for which this Institute

- a) To formulate and evolve a practical tuberculosis programme for the country
- b) To train medical and para-medical in rural and urban areas, and
- c) To undertake necessary research aims

In addition to the above objectives monitoring the District Tuberculosis received from them. We present Jubilee Year of the Institute with this book.

COMMUNITY HEALTH

**PARTICIPATION**  
**OF**  
**GENERAL MEDICAL PRACTITIONERS**  
**A**  
**KEY**  
**TO**  
**SUCCESS**  
**OF**  
**NATIONAL TUBERCULOSIS PROGRAMME**



# NATIONAL TUBERCULOSIS INSTITUTE, BANGALORE



*Pandit Jawaharlal Nehru inaugurates.... 16th September 1960.*



*Prime Minister and VIPs going round the Institute.*

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## 1. INTRODUCTION

Until recently, tuberculosis was considered as a disease which can be attended to by specialists only and the treatment was administered in specialised institutions. Tuberculosis is not only a medical problem, but social and economic problem as well. Hence, the entire society and the community must be involved in tuberculosis control measures. No programme, feasible and scientifically sound it may be, could possibly succeed if the community for which the programme is meant, do not accept it and do not co-operate with health agencies and do not utilise the available facilities to the maximum extent. This community involvement is achieved mainly through the efforts of community leaders and voluntary organisations. They should encourage them to attend the nearest health institutions to avail of the diagnostic facilities and to take treatment regularly for the prescribed period of time if found to be suffering from tuberculosis. They should also help to disseminate health education to the community.

The role of general practitioners whether in private sector or in Government service is very crucial. Often they are required to play the dual role of community leaders as well as treating physicians. Hence, it becomes necessary for them to participate fully and thus form a strong and viable link between the community on the one hand and the specialised institutions on the other.

Specific and potent anti-tubercular drugs have completely revolutionised the treatment of tuberculosis. Absolute bed rest and extra-nutritious diet and collapse therapy etc., have lost much of their relevance. Today, good treatment means good chemotherapy. Suitable combination of drugs given for an optimum period can cure virtually all the patients. Controlled clinical trials have conclusively proved that home treatment of tuberculosis with modern anti-tubercular drugs is as effective and as safe as hospital treatment. Thus, tuberculosis no longer remains within the domain of the specialists. A general practitioner could and

should be able to treat efficiently almost all patients suffering from tuberculosis.

In this small book, a few broad principles of diagnosis and treatment of pulmonary tuberculosis and the role of general practitioners are presented.

## 2. TUBERCULOSIS DISEASE

*Mycobacterium tuberculosis* (human type) is practically the only causative agent of tuberculosis in our country. Though tuberculosis can affect any organ of the body, it is only a person suffering from tuberculosis of lungs who excretes the bacilli in the sputum and is responsible for the spread of infection to others. The mode of infection is by and large air-borne through inhalation of the infected sputum droplets but the development of active tuberculosis disease following infection is governed by a number of factors both intrinsic and extraneous ones including the resistance of the host. Though tuberculosis is not hereditary, heredity plays a part in determining an individual's susceptibility to develop the disease. All these factors are so varied and so many that the ultimate fate of infection in any individual is often unpredictable. The infection is not immediately followed by disease in about 95% of individuals. Some bacilli are often found to be in a dormant state in old lesions and they are the cause of post-primary disease, which can occur even after many years of the first infection. In some, however, the first infection itself may lead to primary disease or the bacilli may sometimes enter the blood stream and may cause early post-primary disease like miliary and meningeal tuberculosis. Tuberculous disease in the organs other than lungs, whether following soon after infection or several years later is the result of hematogenous dissemination.

Tuberculosis continues to be a major public health problem in our country. It is estimated that nearly 4,00,000 persons die of this disease in our country every year. Out of the estimated 10 million patients in our country, nearly one fourth i.e., about 2.2 to 2.5 million are likely to be infectious. The prevalence rate (per 1000 population) is the same in rural and urban areas. Thus,

about 80% of the cases are residing in our vast rural areas. The first point of contact of most of the chest symptomatics is either a general practitioner or the out-patient department of a general hospital. They rarely go directly to the specialised tuberculosis institutions. If tuberculosis is to be diagnosed early and treated effectively, facilities for diagnosis and treatment should be made available at all general hospitals, primary health centres, dispensaries, clinics of private practitioners etc. where the chest symptomatics due to pressure of their symptoms, pay the first visit.

### **3. DIAGNOSIS OF PULMONARY TUBERCULOSIS**

#### **3.1. Clinical Features**

Clinical features are not very helpful in the diagnosis of pulmonary tuberculosis. They can only be suggestive, and to base the diagnosis of pulmonary tuberculosis entirely on clinical examination would not be proper.

Physical examination of the chest is not very helpful because the abnormal physical signs in the chest are not diagnostic of tuberculosis. These can also occur in other lung conditions like lung abscess, bronchitis, bronchiectasis etc. Other important pulmonary conditions which often have to be differentiated from tuberculosis vary with the pathological stage of pulmonary tuberculosis.

The usual practice of doing blood examinations like W.B.C., total and differential, and E.S.R. routinely in every case is no longer relied upon for the diagnosis of pulmonary tuberculosis. Measurement of E.S.R. is of little value in either establishing the diagnosis of tuberculosis or assessing the response to treatment on domiciliary basis and should be avoided.

The changing pattern of lobar pneumonia is very rare today but it remains the most important disease from the differential diagnosis point of view. Today with the ageing of the population, malignancy, collagen diseases, etc., have also to be considered in the differential diagnosis. Diseases like

bronchiectasis and lung abscess have always been a diagnostic problem. Lesions resulting from mycotic and virus infections can also simulate tuberculosis.

#### **3.2 Symptomatology**

The symptoms of early disease such as loss of appetite, low grade fever, loss of weight, etc are quite often vague. These vague symptoms can occur in several diseases other than pulmonary tuberculosis. The cardinal symptoms like persistent cough, pain in the chest, fever and haemoptysis are indicative of tuberculosis. The cardinal symptoms of pulmonary tuberculosis are (1) cough which increases in intensity and becomes productive and the patient is usually febrile; (2) pain in chest which appears when the pleura is involved; (3) haemoptysis is not a constant feature and may occur at any time during the course of the disease; (4) Fever—irregular, intermittent and of low grade. No single symptom is diagnostic of tuberculosis but these symptoms can help in screening the patients for further investigations. The diagnostic steps which are relevant to tuberculosis are as follows:

#### **3.3 Examination of sputum**

Demonstration of tubercle bacilli in the sputum of a patient is specific and conclusive, but failure to find tubercle bacilli in the sputum does not exclude the possibility of tuberculosis. The sputum may be found negative due to various reasons like faulty method of sputum collection, smear preparation, staining and examination, number of bacilli less than 30,000 per ml. of sputum in early cases of pulmonary tuberculosis, and when the lesion in the lungs has not liquified etc. Often repeated sputum examination is necessary to ensure that all infectious cases are diagnosed.

Every patient aged 15 years and above, who has the cardinal symptoms viz., cough, fever, pain in chest of 2 weeks or more duration should get his sputum examined for acid fast bacilli. If the sputum is positive it establishes the diagnosis, but if the sputum is repeatedly negative, further investigations like X-ray of the chest is called for.

Culture examination of sputum is not essentially required for the diagnosis of tuberculosis. It is mostly used for drug sensitivity tests and other investigations. It has been established by some of the recent studies that the yield of sputum positivity from two well conducted spot smear examinations is almost equal to the yield from one culture examination. Overnight or collected specimen is not recommended since the yield of sputum positives from these specimens is not greater than spot specimen. It is important that the specimen of sputum is collected under supervision after proper instructions to the patient. The technique of sputum collection is as important as the technique of microscopy examination and both have to be carried out with great care to obtain reliable results (see Annexure I).

### 3.4. Chest X-ray Radiography

There are no typical radiological appearances which can clinch the diagnosis of pulmonary tuberculosis. Practically, most of the diseases of the lungs lead to abnormal shadows in the chest X-ray that may resemble tubercular lesion. Mere detection of lesion in the X-ray chest even accompanied with suggestive symptoms of tuberculosis, does not necessarily mean that the lesion, even if tubercular, is active in nature needing specific anti-tubercular treatment. However, if an X-ray of the chest does not show any lesion, the possibility of tuberculosis can, for all practical purposes, be excluded. Radiology alone cannot always give a definite clue to the etiology of the lesion as many of the sputum negative cases diagnosed only on X-ray chest examination may not be in fact suffering from active tuberculosis. Thus, X-ray examination is very sensitive, but not specific to arrive at final diagnosis.

The efficacy of chest X-ray radiography is largely determined by the reader's ability to firstly detect the presence of abnormal shadows and secondly to interpret their etiology correctly. Further, the ability to interpret an X-ray film varies from one reader to another. Activity of the lesion detected on chest X-ray radiography can only be

established by positive sputum and/or radiologically changing lesions in serial X-rays. It is advisable that a repeat X-ray examination in sputum negative 'suspect' cases be conducted after 4-6 weeks, and any change in the type and pattern of the lesion to be closely observed. If in the intervening period, the lesion has neither progressed nor regressed, and is static, with no changes whatsoever, it can, by and large be deduced that the lesion is inactive and does not require specific anti-tubercular treatment, and the patient need only be observed further, and put on non-specific treatment, till such time the final diagnosis is established. A collection of some X-rays are shown in the centre-spread pages.

The X-Ray codes used in the National Tuberculosis Programmes are given in Annexure II

There is no justification for X-ray screening of the patient (fluoroscopy), which is hazardous both to the patient as well as to the physician.

### 3.5. Tuberculin Test

Tuberculin test can only indicate whether the individual is infected or not, as such it is not a dependable test to clinch the diagnosis of tuberculosis in an individual. However, a negative tuberculin test, can by and large exclude the diagnosis of tuberculosis, since it means that the individual has not been infected, and there can be no disease without infection.

Tuberculin reaction consists of two components (a) Induration (b) Erythema. In the Interpretation of this test, it is often the induration or the hardness of the reaction which is measured and not the Erythema or the redness. However, a positive tuberculin reaction ( $> 9$  mm induration) does not mean that the individual is suffering from tuberculosis. An induration of less than 10 mm to 1 tuberculin unit of PPD (purified protein derivative) can mean that the individual is not infected and therefore would not be suffering from tuberculosis. Tuberculin reaction is more specific in younger age groups of 0-4 and 5-9 years. If a child

below 2 years is found to be tuberculin positive, it is an indirect evidence of active tuberculous lesion in the body. Tuberculin in higher doses of 2 TU, 5 TU and 10 TU strength are not to be used and any reaction elicited would be due to the "dose response" rather than due to real infection.

Cross reaction due to infection with atypical (non-tubercular) mycobacteria makes interpretation of tuberculin test more difficult.

#### 4. MANAGEMENT OF PULMONARY TUBERCULOSIS

In the management of tuberculosis, the most important breakthrough has been the discovery of specific anti-tubercular drugs and the findings that the treatment of tuberculosis patients in their homes is almost as effective as treatment in sanatoria/hospitals as in-patients. The cure rate is almost 100 per cent and the relapses are also comparatively small. There is no greater danger

to the household contacts of those who are treated at home as compared to those treated in the sanatoria. The so called 'sanatorium regime' viz., absolute bed rest, extra-nutritious diet, tonics and fresh air etc., are not quite important and what is required is to make good chemotherapy available to the patients and ensure that they complete the treatment.

##### 4.1. Anti-tubercular Drugs

The anti-microbial drugs are usually divided into bactericidal and bacteriostatic. The former kills the bacilli in vivo and latter stops the multiplication of the bacilli. From the studies conducted at Tuberculosis Research Centre, Madras and National Tuberculosis Institute, Bangalore the regimen recommended based on technical and operational considerations are given in the accompanying table. Adverse reactions to drugs are listed in Annexure III.

##### 4.2 DRUG REGIMENS RECOMMENDED UNDER NATIONAL TUBERCULOSIS PROGRAMME

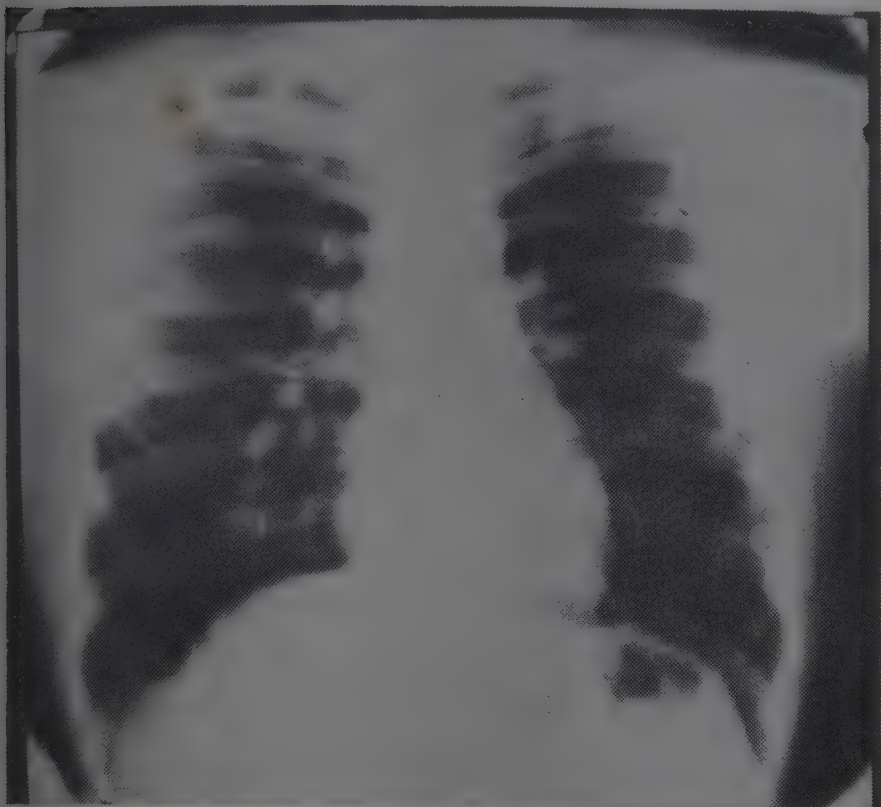
###### a) For Sputum Positive Tuberculosis Patients (Adults)

Code No.	Drugs and Dosage	Mode and Rhythm of Administration	Instructions
R <sub>1</sub>	Isoniazid 300 mg + Thioacetazone 150 mg	Both drugs in a single dose or in two divided doses, orally, Daily	Self-administered at home after meal
R <sub>2</sub>	Bi-weekly regimen Inj. Streptomycin 0.75 g/1 g + Isoniazid 800 to 700 mg (15 mg/kg body weight) with Pyridoxine	Intramuscularly  Orally	Both drugs given at the same time under supervision of the treating physician twice weekly at intervals of 3 & 4 days
R <sub>3</sub>	Isoniazid 300 mg + PAS 10 g	In a single dose. In two divided doses. Both drugs orally, Daily	Self-administered at home after meal
R <sub>4</sub>	Isoniazid 300 mg + Ethambutol 20 mg/kg body weight, i.e., 800 mg for patients weighing <50 kg and 1000 to 1200 mg for ≥50 kg	Both drugs in a single dose, orally, Daily	Self-administered at home after meal
<b>Biphasic Regimen</b>			
<b>a) Intensive Phase</b>			
	Inj. Streptomycin 0.75 g/1 g + Isoniazid 300 mg + Thioacetazone 150 mg <u>OR</u>	First Two Months Intramuscularly, Daily	
R <sub>5</sub>	Ethambutol 20 mg per kg body weight i.e., 800 mg for pts. <50 kg and 1000 to 1200 mg for those ≥50 kg <u>OR</u> PAS 10 g	In a single dose, orally, daily. (PAS and Thioacetazone be given in two divided doses)	Injection given under supervision and the rest to be self-administered at home
<b>b) Continuation Phase</b>			
	With R <sub>1</sub> , R <sub>2</sub> , R <sub>3</sub> or R <sub>4</sub>	As for each regimen	As for each regimen

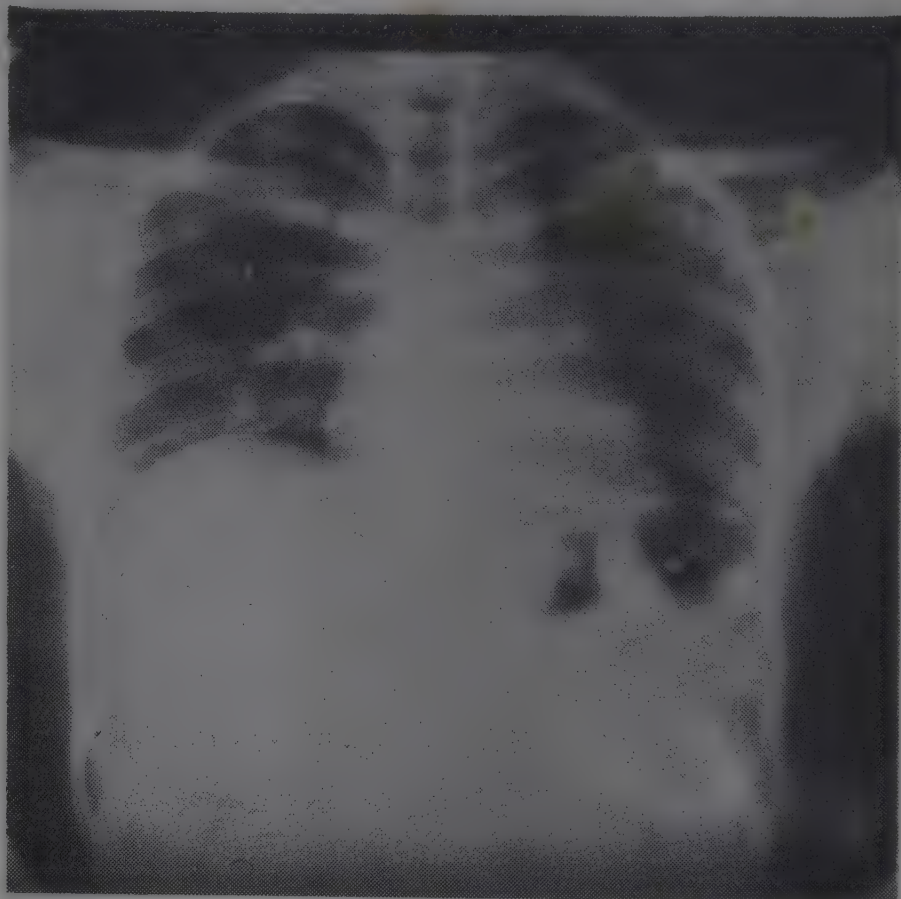
REMARKS: Drug regimen comprising of Inj. Streptomycin 0.75 g/1 g, twice, or even thrice a week + INH 200 mg or 300 mg daily is not sufficiently effective, and hence not recommended.

# HERE ARE A FEW SELECTED X-RAYS PRESENTED FOR YOUR REVIEW

Compare 1 & 2



1



2

Male—30 years—No symptoms

Compare 3 & 4

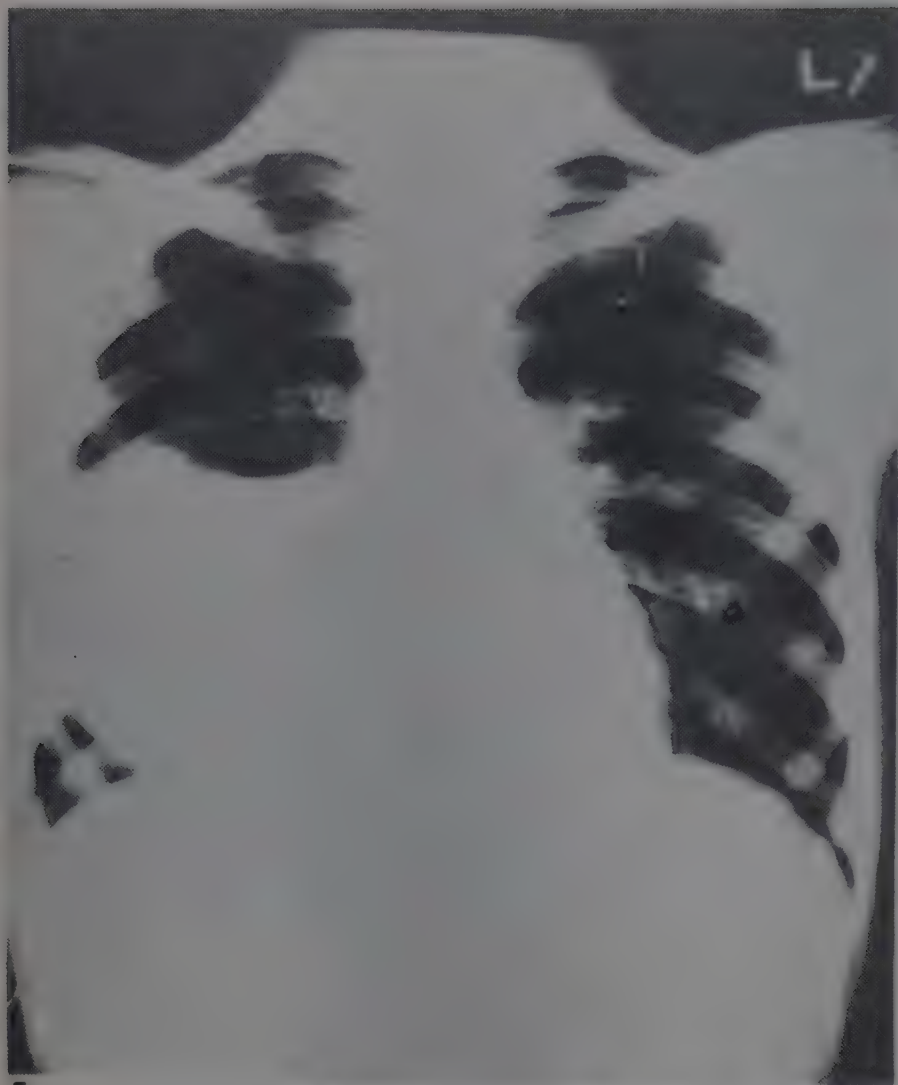


3



4

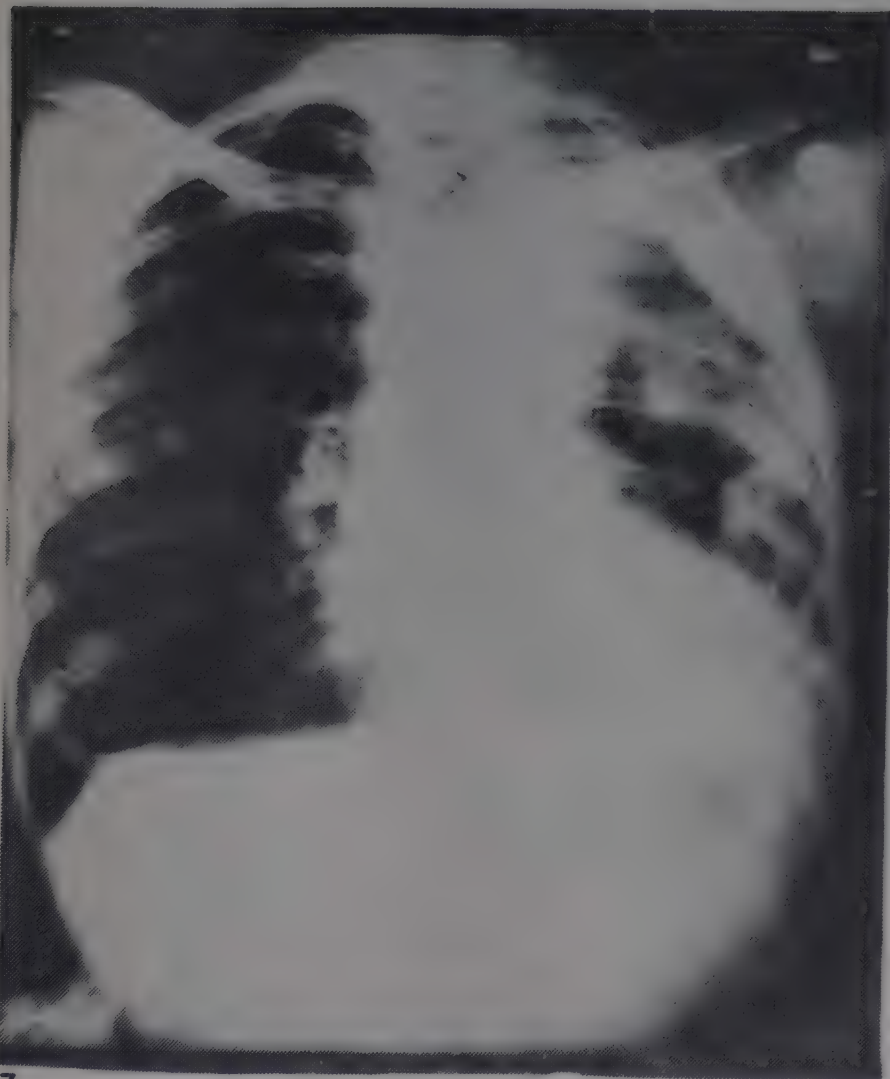
Patient aged 26—Female—Pain in chest—High fever and cough of 8 days duration—Leucocytosis



5  
Adult patient—aged 35  
No symptoms



6  
Female—aged 14 years  
Low grade fever—6 weeks  
Tuberculin Reaction 20 mm to 10 TU



7  
Male—aged 55  
Picked up on Community  
Survey



8  
Male—aged 45  
No symptoms

Compare 9 & 10



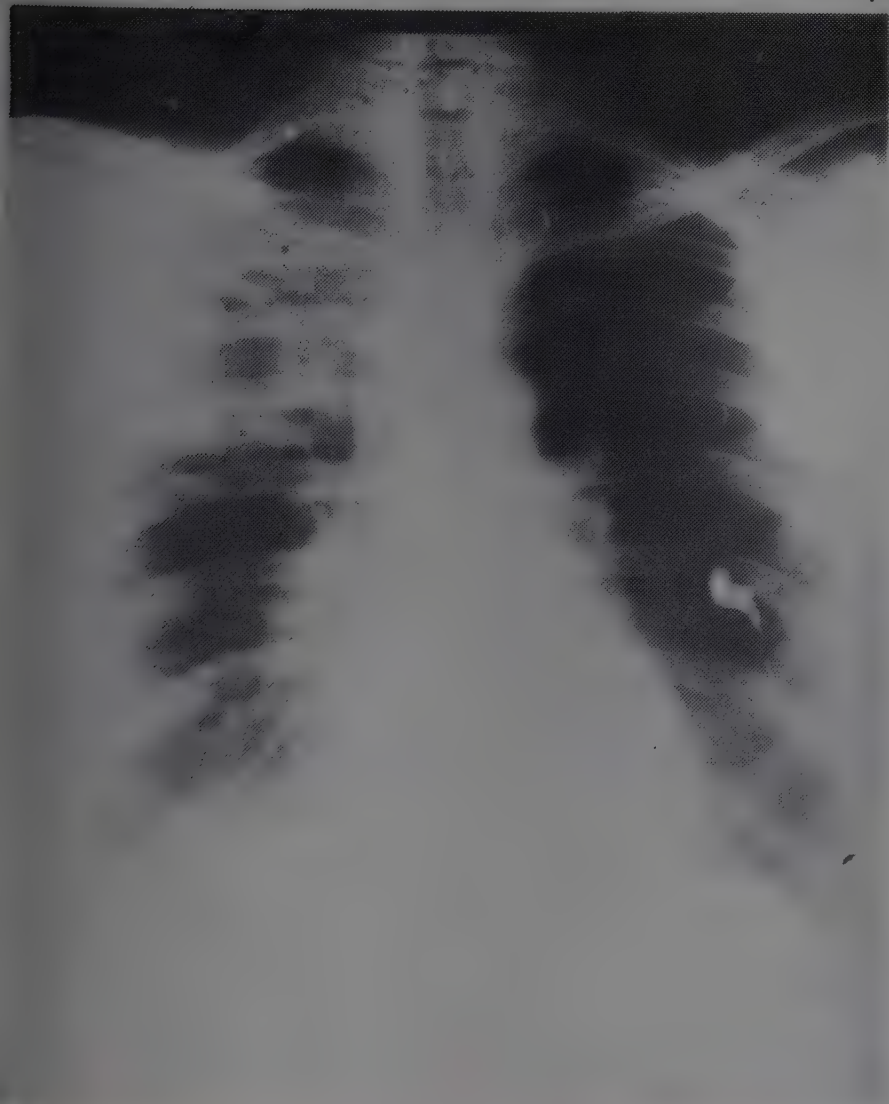
9



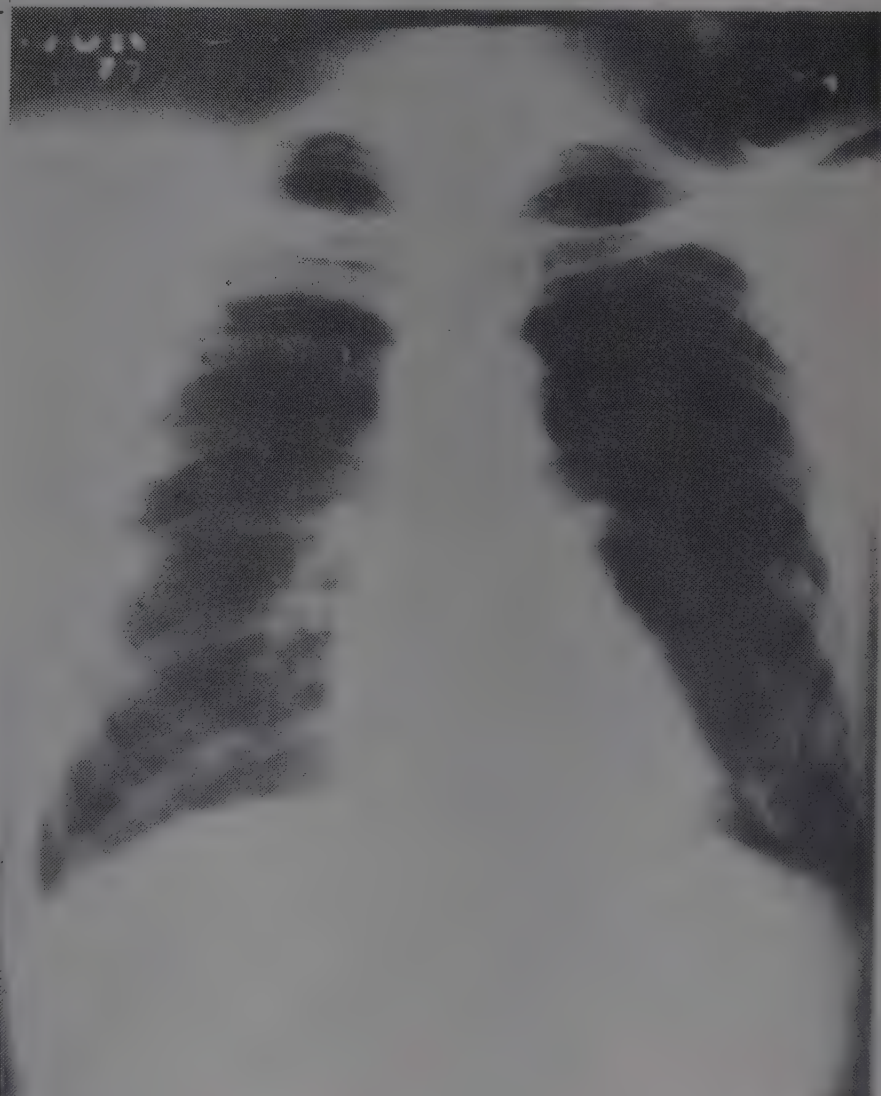
10

Male—aged 15 years History of cough with expectoration

Compare 11 & 12



11



12

Male—aged 35 Cough with expectoration—10 days duration  
Sputum A FB: Negative  
Leucocytic count = Normal

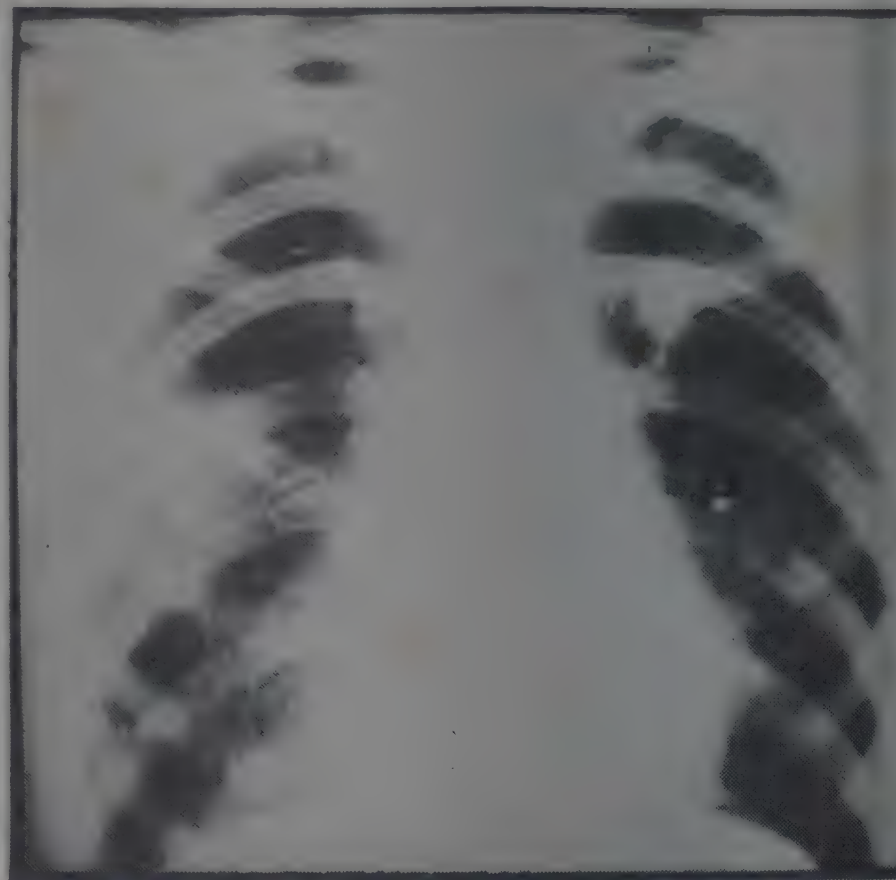
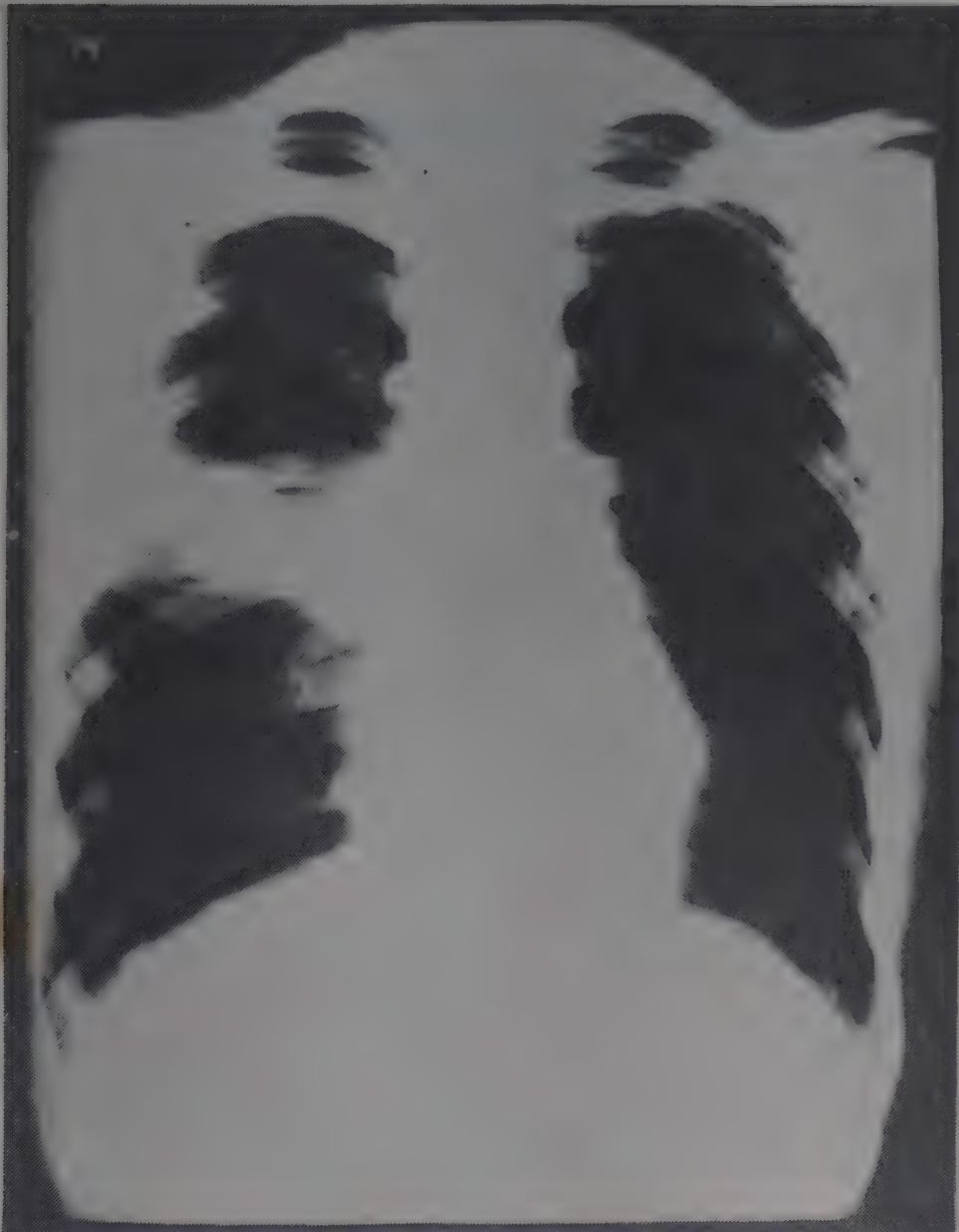
Compare 13 & 14



13

Female—65 years Mild fever and cough—5 days duration  
well nourished

Compare 15 & 16



15

Male aged—12 years  
Mild fever and cough—2 weeks duration  
Leucocytic count—normal  
Tuberculin reaction 18 mm to 10 Tu

b) *For the Sputum Negative Tuberculosis Patients (Suspect Cases)*

Tuberculosis patients in whose sputum AFB are not seen, are advised Regimen R<sub>1</sub> i.e.

Isoniazid 300 mg + Thioacetazone 150 mg	} Single dose orally daily for 1 to 1½ years
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Patients allergic to Thioacetazone can be treated with R<sub>4</sub>.

#### 4.3. Duration of treatment

All patients should be treated for a minimum of one year and optimum of 1½ years duration irrespective of their disease status. Intensive efforts should be made to keep the patient on regular treatment for at least one year.

Treatment can be continued upto 2 years after review at the end of 18 months but continuation beyond two years has no added advantage.

Domiciliary treatment is the treatment of choice and hospitalisation for short periods is recommended only in the following conditions:

- a) Patients requiring surgical treatment.
- b) Management of serious complications like spontaneous pneumothorax, haemoptysis, diabetes, etc.
- c) Acutely ill patients.
- d) Manifestations like miliary and meningeal tuberculosis.

#### 4.4. Response to treatment

Within a few weeks of starting specific anti-tubercular treatment, the clinical symptoms usually disappear. This, however, does not mean that the lesion has healed and the treatment can be stopped. In some cases, on the other hand, even when the tuberculous lesion has fully healed, the symptoms like cough with expectoration and even mild haemoptysis persists due to co-existing bronchiectasis or fibrosis etc. Thus, the success or failure of treatment cannot be properly or rightly assessed on the basis of clinical features alone.

In sputum positive cases, properly conducted sputum smear examinations at regular intervals is the most authentic tool for assessing the response to treatment. Studies have shown that repeated examination of sputum earlier than 6 months is not necessary for assessing the response to treatment. In the programme, 6 months and 12 months sputum examination are recommended. Positive smears at about 6 months or in subsequent months during the course of chemotherapy indicates that either the patient has not been taking adequate chemotherapy, or the bacilli have developed drug resistance necessitating change of drug therapy. In patients who are sputum negative at the beginning of treatment, periodic radiological examinations have also to be conducted to assess the progression/regression of the lesion. However, there are instances, where even though the lesions have fully healed, the radiological shadows remain static and further drug therapy is not required.

#### 4.5. Surgical Treatment

It may be emphasised that surgery is not a substitute but an adjunct to chemotherapy in rare cases. The only surgical procedure now being resorted to are Thoracoplasty and Resection, and that too in extremely selected cases. Drugs have to be continued during and after surgical treatment. A persistent cavity with repeatedly negative sputum is not necessarily an indication for surgery since such cavities are usually healed with an epithelialisation of the inner wall.

#### 4.6. The Role of Cortico Steroids

Cortico steroids have a very small and limited role in the treatment of tuberculosis. They have anti-inflammatory and anti-allergic action and tend to improve only the patient's general condition. They help not only to reduce toxæmia, but also in the absorption of the exudate and prevents its organization. Once the general condition improves cortico steroids must be withdrawn in tapering doses.

#### 4.7. Short-Course Chemotherapy

The duration of treatment for a long period of one to two years with standard anti-tubercular drugs, is believed to be one of the important causes for irregularity and premature stoppage of treatment by the patients. With the advent of Rifampicin and Pyrazinamide, it has become possible to reduce the duration of treatment to six months. There are three different types of bacterial population on which anti-tubercular drugs can act:

- a) Majority of the bacterial population are of actively multiplying type which responds to Isoniazid, Rifampicin and Streptomycin.
- b) Second type of bacilli are intra-cellular and slow multiplying and the drug of choice against this group is Pyrazinamide.
- c) The third group of bacilli are extra-cellular and multiply slowly and intermittently (sputer group) and the effective drug is Rifampicin.

Both Rifampicin and Pyrazinamide quickly eliminate the slow multipliers as well as the intermittently multiplying bacilli and help in sterilising the lesion. There is a fourth group of dormant bacilli which do not multiply at all and hence no drug acts on them.

At least three bactericidal drugs are used for the initial two months followed by two drugs in the continuation phase, in order to reduce the duration of treatment to six months. Bacteriostatic drugs have no place in short-course chemotherapy excepting that Ethambutol may sometimes be used to replace any bactericidal drug in case of drug intolerance. Clinical trials with short-course regimen of six months duration have given encouraging results.

A number of short-course chemotherapy drug regimens have been tried out in various countries of the world, in different combinations and for varying periods. However, in any short course drug regimen, Rifampicin and Isoniazid have essentially to be administered, and the most effective regimen appears to be combination of

Rifampicin, Isoniazid and Pyrazinamide, of which Pyrazinamide is for the initial period of 2 months. Similarly, if Streptomycin is also administered, it may be given for the first two months only. After the intensive daily phase of about 2 months with three or four bactericidal drugs, the subsequent treatment in the second phase may comprise of Rifampicin + Isoniazid daily or even intermittently (thrice or twice a week).

The ultimate results of use of short-course chemotherapy regimens containing Rifampicin and Pyrazinamide would, however, depend on ensuring that proper doses of the drugs in accordance with recommended regimens are given to the patient, which he also takes regularly for the optimum period. Haphazard use of drugs like Rifampicin in inadequate doses, for short periods would not be useful and is bound to create more technical problems and must be avoided. Some of the recommended short-course chemotherapy drug regimens, which have been tried out in various controlled clinical trials in different countries of the world and have given good results, are as follows:

#### SOME SHORT COURSE REGIMENS RECOMMENDED

Sl. No.	Regimens	Duration (in Month)	Relapse Rate %
1	2SHRZ/4HR	6	0-3
2	2SHRZ/4H <sub>2</sub> R <sub>2</sub>	6	0-3
3	2SHR/4HR	6	3-8
4	2EHR/4HR	6	3-8
5	2H <sub>2</sub> R <sub>2</sub> Z <sub>2</sub> /4H <sub>2</sub> R <sub>2</sub>	6	3-8
6	2HRZ/4HR	6	0-3
7	2SHRZ/6TH	8	6

S=Streptomycin; H=Isoniazid;  
R=Rifampicin; Z=Pyrazinamide;  
E = Ethambutol; TH = Thioacetazone

In the daily phase of the regimen, the dosage of R, Z and E is according to the body weight, namely patients weighing less than 50 kg would receive 450 mg of Rifampicin while a patient weighing 50 kg or more would receive 600 mg. Drugs like Streptomycin, Isoniazid, Rifampicin, Pyrazinamide are equally effective if given intermittently twice or thrice a week because after a short exposure to these drugs, the bacilli do not start multiplying for 3 or 4 days i.e., till the next dose becomes available. Addition of Streptomycin in the initial phase of treatment helps in reducing toxæmia and may be given initially with Rifampicin, Isoniazid and Pyrazinamide.

## 5. PREVENTION

Since tuberculosis is an infectious disease, prevention is essential for its control. The basic principles in the prevention of tuberculosis are the same as for any other infectious disease, and they are:—

- a) **interruption of the transmission of infection**  
by finding all sources of infection—the main focus in the tuberculosis programme is to interrupt the transmission of disease by prompt case-finding and efficient treatment programme, since the sputum positives are the transmitters of infection
- b) **protective immunisation to the susceptibles**—it has been observed from studies that BCG protects infants under one year and prevents the post-primary complications like meningeal and miliary tuberculosis. Hence, the present policy of BCG vaccination is to vaccinate the child soon after birth. In urban areas, the new borns are vaccinated in maternity hospitals and child welfare clinics. In the rural areas under the Expanded Programme of Immunization, multi-purpose health workers vaccinate all the new borns before they are one year old along with other immunizations

### c) **chemoprophylaxis—**

Chemoprophylaxis is of two types, primary (infection) prophylaxis and secondary (disease) prophylaxis. Primary prophylaxis is not considered since most of the infectious cases come from the infected group. In secondary prophylaxis those who are infected are put on Isoniazid in daily doses for a period of one year. The proportion of people infected in the country is around 40%. It is impossible to keep such large proportion of people on prolonged Isoniazid medication. The acceptability of medication by the people is poor because most of the infected people are asymptomatics. Hence, in the National Tuberculosis Programme, chemoprophylaxis with Isoniazid is not recommended. However, in children who show strong tuberculin positivity, individual prophylaxis could be considered.

## 6. EXTRA-PULMONARY TUBERCULOSIS

The diagnosis of extra-pulmonary tuberculosis is based on individual cases and their management would be according to the organs involved. As far as chemotherapy is concerned, the regimens recommended in the National Tuberculosis Programme or any of the short-course regimens could be applied.

## 7. NATIONAL TUBERCULOSIS PROGRAMME

The National Tuberculosis Programme has been functioning since 1962 and the District Tuberculosis Programme forms the functioning unit of National Tuberculosis Programme. The District Tuberculosis Officer is in overall charge of the tuberculosis programme in the district. He is assisted by a team consisting of a laboratory technician, an X-ray technician, a treatment organizer and a statistical assistant. All are trained at National Tuberculosis Institute in the organization of District Tuberculosis Programme. The function of the District Tuberculosis Centre is to organize and supervise the case-finding and treatment

activity in all the health institutions in both rural and urban areas. The staff of these health institutions are trained in sputum microscopy and to treat the patients diagnosed by them.

In order to make the programme more effective and to take the services nearer the door step of the people the strategy under the programme has been modified recently. The village health guides—one worker per village or thousand population—are expected to identify chest symptomatics in the village and refer them for sputum examination. Further, health workers (male and female) visit every village periodically. As part of their normal duties, the health worker (male) has been assigned the duty of collecting the sputum from chest symptomatics, making and fixing sputum smears on the slides and sending them to the nearest microscopy centre for processing. The health worker (female) is required to refer all the chest symptomatics to the nearest microscopy centre. Result of sputum examination is conveyed to the patient through the health workers and those with positive results are referred to the nearest health institution for treatment. Workers (male and female) are also responsible for motivating the patients to ensure regularity in treatment. They also vaccinate the new borns with BCG and carry out health education in the community.

## **8. ROLE OF GENERAL PRACTITIONERS IN TUBERCULOSIS CONTROL**

The National Tuberculosis Programme envisages integration of tuberculosis with general health services of the country and also the participation of the general practitioners. The vast majority of tuberculosis cases report first to the general practitioners either in private practice or in Government general hospitals/dispensaries. Studies conducted at the National Tuberculosis Institute have shown that 61% of infectious cases have reported to doctors of modern medicine either in Government or private sector and only 14% have reported to a specialised tuberculosis institution. This

behaviour norm of the population has thrown a big responsibility on all general practitioners who constitute the biggest and most important segment of the medical profession and are often close to the patients. Hence, their active participation in the National Tuberculosis Programme is a key to its success.

It is common knowledge that in many cases the treatment fails to produce the expected result because the drug combinations prescribed are often found to be irrational and duration of treatment insufficient or both. The main cause of failure of treatment is that the patients tend to become irregular or stop treatment prematurely when the symptoms disappear, though the treatment has to be continued much longer to ensure effective cure without any relapse. The responsibility of the treating physician is great since he has to prescribe the correct regimen and also to ensure that the patient takes treatment regularly for the prescribed period. To ensure these, National Tuberculosis Programme has recommended standard regimen based on scientific studies and has provided a system of defaulter retrieval for those patients who do not make drug collections on due dates.

Anti-TB drugs are provided free to all the patients diagnosed under the tuberculosis programme and is made available at all health institutions. The general practitioners could avail of these facilities by contacting the nearest District Tuberculosis Officer. It is possible that the State may make anti-tubercular drugs available to the practitioners through nearest government health facility, provided proper records are maintained by the practitioners regarding the drug distribution to their patients. The general practitioners could also refer the chest symptomatics for sputum/X-ray examination to the nearest government health institution.

The general practitioners could seek the assistance of the District Tuberculosis Officers/State Tuberculosis Centres and even the National Tuberculosis Institute for any technical assistance required in dealing with

their patients both for diagnosis and treatment aspects. The active participation of the general practitioners is essential for

fighting the menace of tuberculosis in the community.

## **Annexure I**

### **Sputum Microscopy – Ziehl-Neelsen Method**

#### **(1) Sputum Collection**

The patient should rinse his mouth, stand with hands on hips, take a deep breath, produce a forceful cough, collect the resultant sputum in his mouth and spit it gently into the waxed paper cup. At least 4 ml. of sputum is collected. The cups are closed properly with their lids.

#### **(2) Smear preparation**

Thick purulent matter is taken with the help of a broom stick and evenly spread on 1/3 of the surface area of the glass slide till a uniform smear is made. The smear is air dried and fixed by passing over the flame thrice.

#### **(3) Staining**

The methodology is as follows:

- a) Cover each sputum smear with a cut filter paper and pour sufficient quantity of Carbol Fuchsin on the slide to cover the stain on the smear for 5 minutes during which heat it twice.
- b) Remove the filter paper, drain off the stain, wash with water and drain.
- c) Decolourise with 25% sulphuric acid and leave for 2½ minutes.
- d) Wash with water and drain.
- e) Pour 25% sulphuric acid again and leave for 2½ minutes.
- f) Wash with water and drain.
- g) Treat the smear with 90% alcohol or methylated spirit and leave for 2 minutes.

h) Counter stain with 0.1% methylene blue for 10 seconds.

i) Wash with water, drain and air dry.

#### **(4) Microscopy**

The examination of the smear is done systematically to cover all areas of the smear. Each smear is examined for a minimum period of 5 minutes before the smear is declared negative. For positive smear the results are graded as follows:

1-10 bacilli seen in 5 minutes examination  
= actual number  
More than 10 bacilli = +  
Masses of bacilli in the smear = ++

Both false positive and false negative errors can occur. Considerable practice and experience is therefore required to overcome this problem. False positives can occur in any of the following conditions:

- a) By using old slides having scratches.
- b) By allowing Carbol Fuchsin stain to dry up on the slides.
- c) Inadequate decolourisation with 25% sulphuric acid.
- d) By not cleaning the objective lens after examination of a positive smear.
- e) When the time of 5 minutes for microscopy examination is not observed.
- f) By the use of poor quality of Carbol Fuchsin stain or when less time is given for counter staining with methylene blue.

## ANNEXURE- II

### Codes used for X-ray reading

N	— for Normal	: When no abnormality is seen; prominent hilar and broncho-vascular markings within the normal limits and calcifications are to be considered normal.
NT	— for Non-Tubercular conditions	When abnormalities are seen but are considered not due to pulmonary tuberculosis; it includes cardiac conditions.
TBP	— for pulmonary tuberculosis	When pulmonary shadows suggestive of tuberculosis are seen and are considered active.
PLEF	— for pleural effusion	When fluid has collected in the pleural space and is likely to be due to tuberculosis.
TBHA	— for tubercular Hilar adenitis	When enlargement of hilar glands considered due to tuberculosis is seen.
OBS	— for observation	: When abnormal shadows are seen but their aetiology is doubtful; if considered tuberculosis, the lesion is judged as inactive or doubtfully active.
TI	— for technically inadequate	When the quality of the frame in respect of positioning, density, contrast and artefacts/foreign bodies obscuring lung fields make it difficult to arrive at a satisfactory interpretation.

#### Code for comparison of X-ray reading:

The following code is used at the time of reading and recording of result of a follow-up X-ray examination.

C	— for clearance	: It should cover complete clearing of shadows.
I	— for improved	: When there is partial clearing.
S	— for stationary	: When no appreciable change is seen.
D	— for deteriorated	: When the shadow has spread or cavity has formed/ increased in number (increase in size of the cavity alone is not considered deterioration)

## ANNEXURE III

### MODE OF ACTION & ADVERSE REACTIONS TO ANTI-TUBERCULOUS DRUGS

Drugs	Actions	Adverse Reactions
1. Isoniazid (INH)	Bactericidal	Polyneuritis Rarely hepatitis or Psychosis
2. Rifampicin	-do-	Hepatitis
3. Pyrazinamide	-do-	Arthralgia
4. Streptomycin	-do-	Giddiness or deafness
5. Ethambutol	Bacteriostatic	Optic neuropathy
6. Thioacetazone	-do-	Skin reaction or hepatitis Rarely Exfoliative Dermatitis
7. Para-amino Salyclic acid (PAS)	-do-	Anorexia, vomiting, Diarrhoea, etc.

## Correct Diagnosis for the X-Ray Pictures shown on centre spread pages

### X-Ray No. 1 & 2

Normal x-ray of a healthy adult 1) In full inspiration. 2) In full expiration.

### X-ray No. 3 & 4

Because of the Toxaemia and high Leucocytic count, diagnosis of Lobar Pneumonia was considered. She was put on broad spectrum antibiotics for 2 weeks and responded to treatment. Pneumonia completely resolved.

Diagnosis: Lobar Pneumonia right middle lobe simulating Hydatid cyst.

### X-ray No. 5

X-ray shows a round homogenous opacity similar to X-ray No.3. This was proved to be Hydatid cyst on surgery. Patient had neither Toxaemia nor cough with expectoration.

### X-ray No. 6

X-ray shows enlarged para-trachial glands and right hilar shadows. Diagnosed as a case of mediastinal adenitis and treated for tuberculosis. Patient responded satisfactorily.

### X-Ray No. 7

Multiple cannon ball shadows seen in the lung.

Diagnosis: Metastatic Carcinoma. The primary was Carcinoma of the colon.

### X-Ray No. 8

X-ray shows clearly defined rounded opacities in both lung field. Casson's test positive (+).

Diagnosis: Multiple Hydatid cyst.

### X-Ray Nos. 9 & 10

X-ray shows fibrotic lesion right upper lobe, simulating active pulmonary Tuberculosis. Bronchography revealed Bronchiectasis right upper lobe shown in X-Ray No. 10.

### X-Ray Nos. 11 & 12

X-ray suggests Cavitary Tuberculosis right upper zone but sputum was negative on direct smear. The patient was put on broad spectrum anti-microbials. 3 weeks later x-ray. X-Ray No. 12 showed complete clearing of the shadow.

Diagnosis: Lung abscess.

### X-Ray Nos. 13 & 14

Diagnosis of malignancy was made on the first x-ray, X-Ray No. 13. But as the patient was reasonably healthy, the diagnosis of malignancy was doubted. A second x-ray was repeated on the 5th day X-Ray No. 14, and the shadow was completely cleared.

Diagnosis of Pneumonitis was made which cleared in 5 days time.

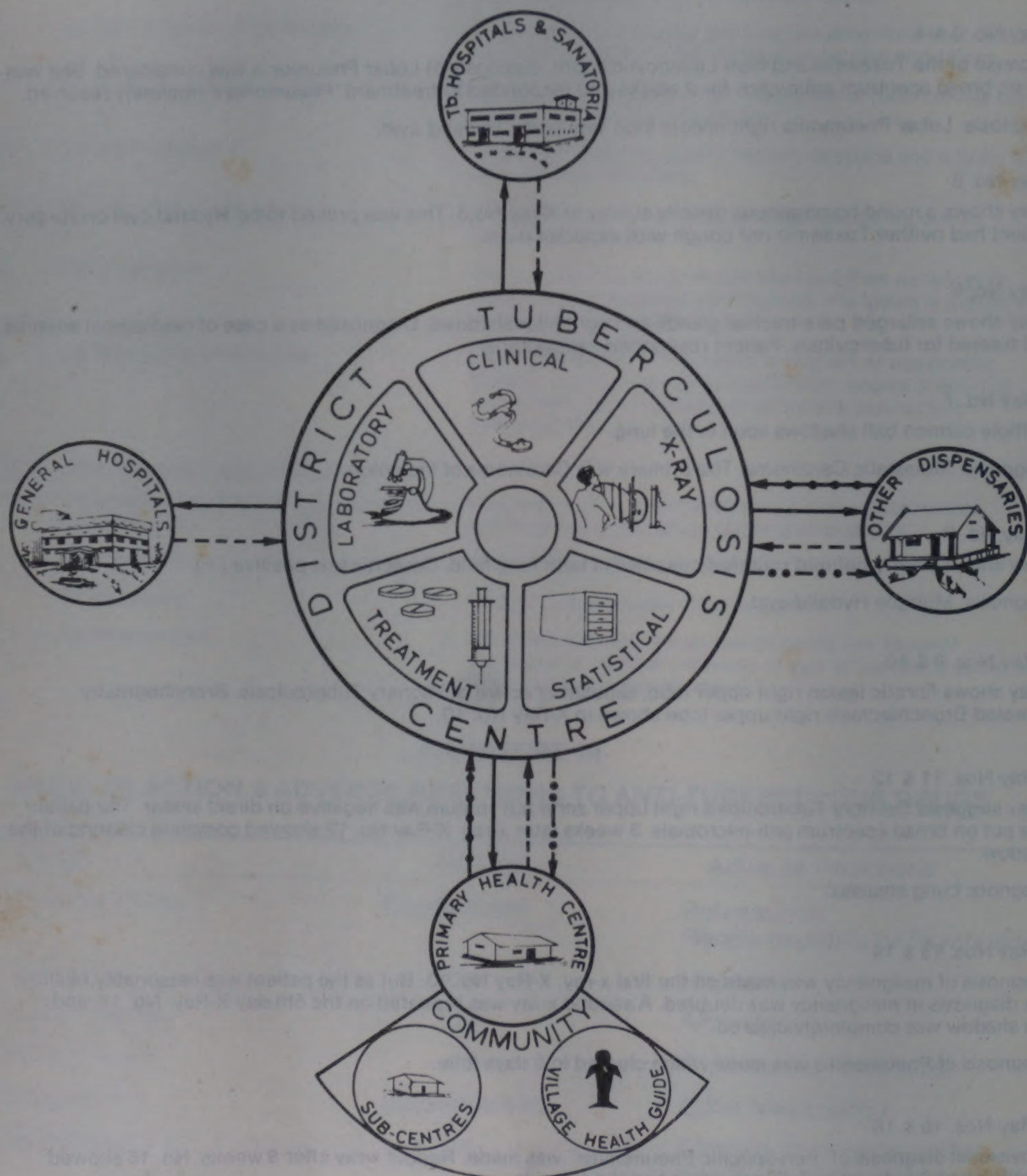
### X-Ray Nos. 15 & 16

Provisional diagnosis of "non-specific Pneumonitis" was made. Repeat x-ray after 8 weeks. No. 16 showed extension of the disease and fresh spread on the left side.

Diagnosis of primary Tuberculosis was made—patient responded to anti-tubercular therapy.

# DISTRICT TUBERCULOSIS PROGRAMME

(DIAGRAMMATIC REPRESENTATION)



—●—●—●— REFERRED FOR CHEST X-RAY  
 - - - - - RESULTS OF X-RAY INTIMATED

————— TRAINING, SUPERVISION & SUPPLIES  
 - - - - - REPORTING, SEEKING TECHNICAL ADVICE



